

c.) Remarks:

The claims are 1, 3-6, and 9-27, with claims 1, 11-14 and 24-26 being independent. Claim 6 has been amended solely as to matters of form unrelated to patentability. Claim 2 has been cancelled without prejudice or disclaimer of the subject matter presented therein. Claim 27 has been added to provide Applicants with a more complete scope of protection. Support for claim 27 can be found (inter alia) on page 19, lines 5 to 9 in the specification. Reconsideration of the claims is expressly requested.

In the event that the claims are deemed allowable, applicants request rejoinder of claims 14-26 under MPEP §821.04 and request an opportunity to amend claims 14-26, if need be, to be commensurate with the allowed claims.

The Examiner objected to Claim 2 under 37 CFR 1.75(c), for allegedly being in improper dependent form for failing to further limit the subject matter of a previous claim. Cancellation of Claim 2 renders the objection thereto on prior art, moot. Therefore, withdrawal of the objection is respectfully requested.

Claims 1-6 and 11-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Burger et al., WO 98/58100 (or its counterpart, U.S. 6,372,303) (Burger '303). Claims 9 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Burger and further in view of Raoux et al., U.S. 6, 162, 709 (Raoux '709). Cancellation of Claim 2 renders the rejection, thereto on prior art, moot. Applicants respectfully traverse these rejections.

The Examiner argues that Burger discloses that the auxiliary electrode is placed in the vacuum chamber and is in the plasma that is within the chamber. However, Burger clearly discloses in Figures 1, 3-5 and 7 that the bearing device 11 (the auxiliary

electrode) is positioned outside of plasma 20. Burger teaches away from the present invention because the auxiliary electrode used by the Applicants is positioned in the plasma itself. To the contrary, in Burger the bearing device 11 carries vertically oriented substrates 10 and to avoid damage to the bearing device 11 during film formation, it is positioned outside the plasma. In the present invention, however, the auxiliary electrode is located in the plasma stream to better control film formation. Further, in the present invention, to avoid discharge of the auxiliary electrode, a low current level is set therein. This feature avoids deposit of a film layer thereon. In Burger, however, the bearing device 11 is spaced outside the plasma to avoid depositing a film thereon.

The Examiner admits that Burger does not teach the maximum amplitude of the bias voltage. The Examiner, however, argues that a cause and effect relationship exists between the magnitude of the voltage and the hardness of the deposited layer and further alleges that it would have been obvious to one of ordinary skill in the art to use voltages that gave the desired hardness of the deposited layer. Burger does not teach or suggest that a maximum amplitude of the bias voltage exceeding 80 V may cause discharge (see page 11, lines 22-25, in the specification). In addition, Applicants have demonstrated that it is possible to control the quantity of hydrogen radical without changing the quantity of SiH radical by using the deposited-film formation method of Example 2 when the voltage amplitude is set to 80 V or less (see Figure 1; see also page 22, lines 11-24 of the specification).

Burger is said to teach a substrate holder, which acts as an auxiliary electrode by producing a substrate bias, and which is supplied with a frequency that

allegedly overlaps Applicants' claimed range. Burger's frequency range is from 0.1 KHz to 10 MKz, preferably 1-100 KHz. Accordingly, Burger tends to teach away from the present claimed range. The lower limit for the frequency of the voltage applied to the instant auxiliary electrode is at least 1 MHz to prevent inducing unnecessary movement of ions (see page 15, lines 24-25, in the specification). To the contrary Burger prefers a frequency of 1-100 KHz, which is less by a factor of 1000 than Applicants' lower limit.

With regard to claim 6 the Examiner also acknowledges that Burger teaches but a single electrode (11) that acts as a substrate holder for multiple substrates. The Examiner cites *In re Harza*, 124 USPQ 8, 11 (1977) to argue that using a plurality of bearing devices 11 is a mere duplication of parts because one skilled in the art would recognize the equivalence of multiple electrodes each holding a single substrate. However, the court in *In re Harza* held that a duplication of parts has no patentable significance unless a new and unexpected result is produced (emphasis added). See also MPEP §2144.04 (C). The present invention discloses in Table 2 (page 28 of the specification) that arranging a plurality of auxiliary electrodes at least in the flow direction of a raw material gas unexpectedly results in the uniformity of characteristics of a deposited film in the gas flow direction without causing the degradation of film quality in the entire surface of the deposited-film while maintaining a high rate of film formation (see page 26, line 23 to page 27, line 5 and page 14, lines 13-18, in the specification).


With regard to the rejection of claims 9 and 10 the defects of Burger are not remedied by Raoux '709. Raoux merely teaches a process where a pulsed voltage bias is applied to a substrate by an electrode that is embedded in the substrate holder and

comprises a nickel rod that has a small diameter and a small area facing the substrate. However, Raoux does not teach or suggest that the form of the auxiliary electrode, for example, is a round bar that faces a substrate, is edgeless and is as small as possible, which results in minimizing abnormal discharge, turbulence of gas flow, and radiation of heat from the auxiliary electrode (see page 16, lines 17 to 27, in the specification).

Accordingly, the Applicants submit that none of the references, whether considered alone or combined, discloses or suggests the present claimed invention nor renders it unpatentable. It is respectfully requested that the claims be allowed and that the case be passed to issue.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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